THE

Cane Growers'

QUARTERLY BULLETIN

VOL. XIX., No. 3 1 JANUARY, 1956

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BUREAU OF SUGAR EXPERIMENT STATIONS
BRISBANE

THE CANE GROWERS' QUARTERLY BULLETIN

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The

Cane Growers' Quarterly Bulletin

VOL. XIX. 1 JANUARY, 1956 No. 3

A Cane-Truck Trailer

By H. G. Knust

The accompanying illustrations show the general features of a cane trailer in use by Messrs. Smart and Till, Calavos, Bundaberg. This outfit saves time and hard work when cane has to be hauled in this manner. The time taken to unload the full truck and load the empty does not exceed five minutes. The effort usually needed for lifting and adjusting portable points is entirely eliminated.

The trailer has a welded frame and is mounted on heavy duty motor lorry wheels. The rectangular portion on which the cane truck is carried measures 4 feet by 2 feet, while the pointed section to which the drawbar is attached extends about 18 inches from the

Fig. 51—Loaded truck being off-loaded.

Fig. 52—Trailer ready to receive empty truck.

Fig. 53—Empty truck being loaded.

rectangular frame. The 40 lb. rails used are 11 feet long and have lugs welded to the outer base 4 feet from the front end. Bracing is welded to them at suitable intervals and they are tapered to fit snugly on the tramline at the delivery point. A ¼ inch plate about 6 inches by 4 inches is welded to the outside of the tapered section.

A goose-neck spring loaded type of safety catch is mounted on the rectangular frame. The lugs on the rails are drilled to take loosely a ⅝ inch round mild steel bar which is used as a pivot, this passes through holes in the channel iron near the back of the rectangular frame.

The plates which are welded to the outside of the tapered sections are splayed outward so that they will guide the rails into the correct position if these have not been exactly centred when the trailer is hauled astride the tramline. These plates, associated with the loose pivot, save valuable time when unloading.

The rails are lowered to the tramline and the empty truck is pushed on to the trailer. As the truck approaches the front of the trailer rails it causes them to assume a horizontal position. The truck axle meets the safety catch which opens easily allowing the entry of the axle and closes readily when the axle is in the correct position. The operator then moves off to the field with the truck mounted over the trailer and 7 feet of rail protruding from the rear. To unload the full truck the trailer is set astride the tramline, the operator releases the safety catch and pushes the truck to start it moving; as it progresses the trailer rails automatically lower until the tapered ends meet the tramline by which time the loaded truck has gained momentum and runs well clear of the trailer.

The Implications of Restriction in the Sugar Industry*

By NORMAN J. KING

The extension of areas which took place during the sugar industry's expansion period was not, in itself, the sole reason for the high production of the past two years. But it was a major contributing factor, and it became important economically because of the succession of very favourable seasons. The harvested acreage rose by 34 per cent. in the past three years, while sugar output increased by 39 per cent., indicating the influence of climatic factors. It might just as easily have happened that the rise in production was less than the acreage increase, and it will happen that way in a year of average or subnormal rainfall.

The phase of restriction of production is now upon us, but it must be considered as an inseparable corollary to the period of expansion which preceded it. The Government's decision to increase the State's sugar output was doubtless the result of the 1950 Royal Commission on the sugar industry, and the Empire Sugar agreement which was reached in 1951. Large acreages of previously virgin land were assigned for sugar production and, with a defined export quota of 600,000 tons of sugar per year, the area assigned was such as to ensure the attainment of that quota in an average season. It is logical, therefore, that with the same area in production there would be a surplus of sugar in a better than average year. That is what happened in 1954 and, on the basis of early estimates this year, it appeared that the experience would be repeated in 1955.

But such are the vagaries of seasons that the promise of six months ago is not being realised. A series of factors have combined to reduce the anticipated sugar output to well below the earlier estimated figure. Early crop

*An A.B.C. broadcast.

forecasts must take into account, among other things, the likelihood of winter and spring growth; but this year the very heavy flowering of the cane prevented that late development. In addition the extension of the wet season operated against the usual rise in sugar content of the crop in the winter months, and the net result is that crops are not only lighter than anticipated but are not producing as much sugar. The early estimate of production indicated that Queensland mills could, if they crushed all cane offering, manufacture sugar to the extent of 83,000 tons above home and export market requirements. This would have meant a surplus of some 600,000 tons of cane and, since the Sugar Board had intimated that it was unlikely that surplus sugar would be acquired and paid for, the industry was facing the problem of what to do with such a formidable quantity of unwanted crop.

The final estimate of the crop will not be available until next month, but owing to the factors which I have mentioned earlier it will not now be surprising if the amended figures are not much in excess of our market requirements. In other words, the seasonal conditions have, to a large extent, solved a rather serious over-production problem.

I use the words "to a large extent", because there was one other factor which acted as a brake on production this year. It was the man-made control of reduced fertilizer usage. Many growers attempted to solve the threatened over-production by reducing farm efficiency. They doubtless considered that it was better economy to farm the same area with less fertilizer than to produce the required crop on less acres at the previous efficiency level. It is an interesting problem in farm economics to balance expenditure on fertilizer on a reduced acreage against the costs of cultivating the full area. Whatever the answer to the problem may be it is a pity that so many have decided to allow the fertility of their land to decrease as a means of meeting the necessary restriction of production. It is, in fact, somewhat paradoxical that at the same time as this restrictive method is being practised there is a steady demand for new cane varieties capable of producing larger crops.

But what of the future? Should this year's sugar production be not much in excess of requirements, what will be our position in 1956? There are interesting possibilities. There is firstly the seasonal one. The sugar industry has experienced a run of good years. The last four seasons have been very favourable and there has been only one subnormal season in the past eight. Without proposing to join the ranks of the long range weather forecasters the odds seem in favour of a below average season in 1956. The industry need lose only two tons of cane per acre as the result of unfavourable weather to reduce the cane yield by three-quarters of a million tons. There is another important factor which can have a bearing on next year's production, and one which I have quoted previously. During the expansion period there was an abnormally large planting in 1952. In the normal cane rotation this acreage will be ploughed out after the 1955 harvest and will be fallow in 1956. This must result in a reduced acreage for harvest next year and, if combined with an unfavourable season, the result will be that peaks will not be attained and restriction will be unnecessary.

With these possibilities in mind the implications of restrictive farm practices in the industry should be considered carefully before such measures are applied on a wide scale. Queensland has some degree of obligation to fill home and export quotas each and every year, and it is not in the best interests of our industry, or of our national economy, if we fail to fill our overseas quota.

So it is obviously undesirable that farm efficiency be sacrificed. Fertilization should be maintained at a reasonable level and cultivation practices should be continued as in normal times. The extensive nature of our sugar districts, which are dotted along a thousand miles of coastline, introduces

a variability in season, and even in the best of years there are some areas which do not produce peak tonnages.

Such shortfalls can be taken up by the more favourably situated mills. In a less bounteous season, such as is indicated for next year, there is all the more reason for planning right now to maintain both area and efficiency.

It might reasonably be asked, "What will be the growers' position if the run of good years continues in 1956, and they are faced with more cane than can be harvested ?" That is a position which must be considered and faced up to. But is not farming always a gamble ? And the gamble in the sugar industry is one against the possibility of drought, frost, cyclones, floods and low sugar content. It is a more difficult problem than in such crops as wheat because a sugar crop, once planted, is harvestable for three or four years. Whereas the wheat grower has to estimate the market only some nine months ahead, and can decide on his acreage accordingly, the sugar grower is looking years ahead because of the perennial nature of his crop. The results, in both cases, are dependent upon that unpredictable factor—the seasonal rainfall—but in the case of the wheat grower, only one harvest is affected; with the cane grower a poorly developed plant crop is frequently followed by an unthrifty ratoon, irrespective of the conditions.

It will never be practicable to have just sufficient land under crop to meet market requirements precisely—or even approximately—in any given year. The overall season, and the seasonal variability along the wet and dry coastal fringe, will be unknown a year in advance. In the same way the application of fertilizer, which has to be made eight to fourteen months prior to harvesting, is a gamble on the season ahead, and growers cannot expect to be able to regulate production precisely by that means. There will always be the possibility of adequate fertilizer applications being followed by a bounteous wet season, or poorly fertilized crops being subjected to subnormal weather. Between these extremes infinite variation could occur.

Regulated production may be attained within fairly close limits in a district like the Lower Burdekin where all cane is irrigated. In such an area drought is under control and frosts do not occur, but even there, there is the risk of cyclone damage. In the rest of the sugar belt regulated production is more of a dream than an attainable objective, if one is considering fairly precise control. Droughts in the central and southern areas, frosts in the south-east quarter, droughts, floods and cyclones in the far north, can in any year upset the most careful predictions.

A New Fertilizer Compound

It has just been announced by Du Pont Company of U.S.A. that a remarkable new fertilizer material has now reached commercial production in that country. With the trade name "Uramite", the fertilizer contains 38 per cent. nitrogen (compared with 20.5 per cent. in sulphate of ammonia).

The unusual feature of this nitrogenous fertilizer is that it is almost completely insoluble in water. In the soil, however, it dissolves slowly over a period of months at a rate which conforms to moisture and temperature. The compound is a mixture of methylene ureas and, during decomposition in the soil, it is converted to a form which is available to plants. The relative insolubility and the prolonged release rate are claimed to provide adequate nitrogen for plant growth and vigour continuously and uniformly through the entire growing season.

The information available refers to experimental and demonstrational work on turf, ornamental plants, and horticultural crops. It is not stated whether it would be suitable for crops such as sugar cane which, because of their large bulk and rapid growth, demand large quantities of nitrogen in a limited period in the hot, wet months.

If, and when, this material becomes available in Australia the Bureau will initiate experimental work to assess its possibilities.—N.J.K.

Two Useful Grubber Adaptations

By C. L. TOOHEY

A Moore Park grower of the Bundaberg district recently demonstrated two novel and successful adaptations to one of the more important farm implements, *i.e.*, the grubber.

The first of these is simply the accepted rigid tyne type grubber—with one addition. Fitted to the top of the frame is a wire mesh basket of identical dimensions to the grubber top (Fig. 54). Designed especially for recently cleared land where it was seen working the advantages of the basket are immediately obvious. All disturbed roots, rocks, etc., are thrown in and carried to the end of the drill, eliminating the tedious necessity of manually transporting debris to be removed. In heavily littered fields a youth may follow the grubber, throwing extraneous matter into the basket.

Fig. 54—Showing wire mesh basket for collecting stumps and stones.

The grower concerned has also attempted to overcome the problem of cultivating advanced cane and the remaining illustrations (Figs. 55 and 56) depict a normal cultivator frame to which have been fitted two sub-frames of 2 inch by ¾ inch steel carrying standard spring tynes. Outstanding feature of this implement is that it is not necessary to sacrifice height to obtain strength. By means of an adjustable arch on the sub-frames it is possible to obtain high clearance while still using the shorter spring tyne accepted for early cultivation. Thus it becomes possible to work cane for a considerably longer period than would normally be the case. Both tynes and sub-frames are adjustable to suit any row spacing and no difficulty is experienced in working immediately in against each stool, even in well developed cane. Two standard fertilizer hoppers complete the implement.

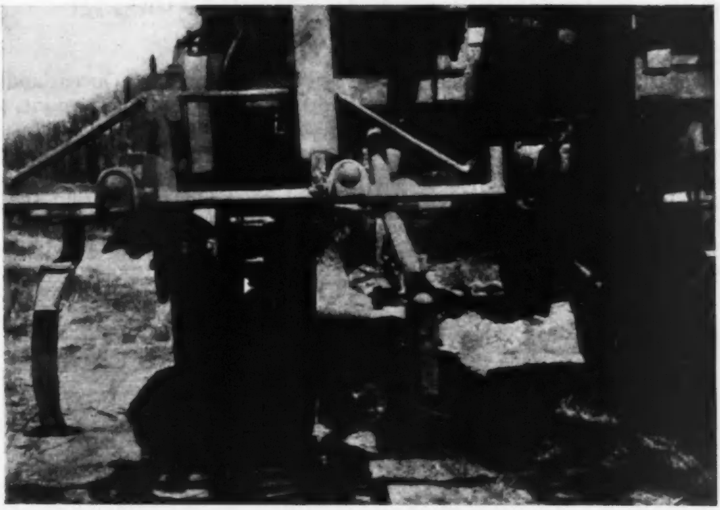


Fig. 55—Close-up view of sub-frame.

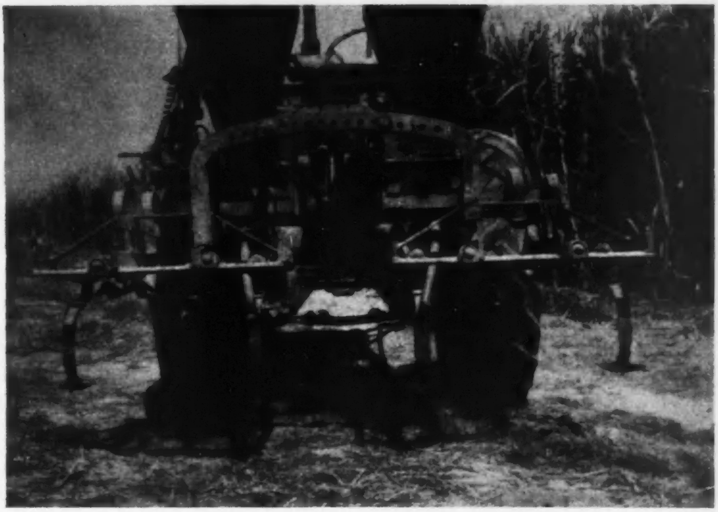


Fig. 56—Showing sub-frame and adjustable arch.

Coral Lime in Mauritius

By J. H. BUZACOTT

In Queensland many attempts have been made in the past to utilise coral sand from the Great Barrier Reef for the liming of agricultural land. Several years ago a firm operated in the Innisfail district transporting coral from the reef to the Johnstone River by motor launch. The analysis of the coral sand showed a high percentage of calcium carbonate, over 90 per cent. in most instances. The principal difficulty associated with its use was that without grinding in a ball mill its composition was not sufficiently fine to give the relatively rapid reaction which pulverised earth lime or burnt lime will give. More recently an attempt has been made to launch a project on similar lines to bring in pulverised coral to Cairns from coral atolls situated on the nearby reef. These projects, however, have to face the stiff opposition of huge deposits of limestone such as exist at Chillagoe, the Reid River and elsewhere in Queensland, where the limestone can be mechanically handled, crushed and loaded direct into railway trucks which can then be delivered to the farmer concerned with a minimum of handling.

In the island of Mauritius, which is not so favoured as Queensland with adequate stocks of limestone, it is necessary to use coral for practically all purposes for which lime is required. Even the lime used in the sugar mills for clarification comes from the coral reefs which surround the island. The lumps of coral and the coral sand are collected and transported by Indian labourers in native sailing craft. From the point of view of our country of high labour costs the method looks very primitive, but apparently in Mauritius, where there is a superfluity of labour, it is quite successful.

Fig. 57—Landing coral and coral sand, Mahebourg, Mauritius.

The accompanying photograph (Fig. 57) shows Indians unloading their cargo of coral from their boats at Mahébourg, a port on the south-east coast of Mauritius. The boats are quite small with a mast, the top of which slopes very markedly backwards and gives them a rather rakish appearance. With their white sails gleaming against the blue waters of the bay the coral fleet presents a most attractive picture. As can be seen in the photograph, the coral is unloaded in baskets which resemble clothes baskets; they are carried on the heads of the labourers.

Erect Varieties for Better Profits

By NORMAN J. KING

The lodged cane problem, which caused so much dislocation of harvesting during the 1954 season, was even more acute in some areas during 1955. The cyclonic blows in the Mackay area had the effect of bending the cane on many properties, resulting in cutting difficulties and in low truck weights.

Fig. 58—The seedling cane I.222. This is one of the more promising varieties produced at Meringa. It is being propagated extensively.

But in the Lower Burdekin heavy, unseasonal rains in May caused the collapse of thousands of acres of heavy crops, some of which lay completely flat. The loss of industry money in cane deterioration, lowered sugar content and higher cutting rates—not to mention the effect on transport costs—must, over the entire sugar belt, be enormous.

The occurrence of so much lodged cane for two seasons in succession, highlights the urgent need for lodging-resistant varieties. Cane growers do not expect the cane breeders to develop varieties which would stand up perfectly under cyclonic conditions, but they do feel the need for canes which are less prone to lie down merely by reason of their top-heaviness or because the soil is softened by rain.

The economics of growing smaller, upright crops as compared with heavy recumbent ones were discussed in the last issue of the Quarterly Bulletin, and it is timely at this date to indicate some of the results achieved by the cane breeders in their efforts to solve this problem. It is not only in the Lower Burdekin and Mackay that the lodging has occurred, as growers in Abergowrie and in most of the far northern areas know to their cost. The demand for lodging-resistant canes is widespread and it is unlikely that any one variety will fulfil the requirements in all areas.

The variety Q.57, now on the approved list in several far northern areas, was not developed specifically because of its upright habit, but it has shown a remarkable ability to remain erect in heavy crops even when soil is rendered soft by continued rain. There have been many instances in the last two seasons of Q.57 being the only erect

Fig. 59—The seedling cane I.233. This is the best anti-lodging variety yet produced.

variety on farms which were otherwise filled with flat or leaning crops. The disability which Q.57 possesses of losing its erectness in a hot fire can be guarded against by a "cool" burn early in the morning when the trash is damp.

Fig. 60—A stool of the seedling cane K.641. This variety also shows considerable promise.

But some of the later products of the cane breeders are showing as much, or more, promise as erect varieties. The illustrations in this article depict three advanced seedling canes which have reached the stage where they might be considered for rich land, where existing varieties normally lodge. Their general characteristics are satisfactory inasmuch as they germinate, grow, cover the ground and ratoon as well as the majority of canes. But, in addition, they possess the factors of having good sugar content and a high degree of erectness. In fact I.233 is the most lodging-resistant cane bred to date. Some or all of them are being propagated widely in the districts from Mossman to Ingham. Another of those illustrated—the seedling K.641—is also an anti-lodging type and possesses other characters which make it a desirable variety.

These varieties have been selected for their high sugar content. They should make a much needed contribution to the varietal position which, on rich lands, is not too good to-day.

Progress in the Development of Varieties for Rich Land

By J. H. BUZACOTT

In the Proceedings of the Twenty-first Conference of the Queensland Society of Sugar Cane Technologists the writer presented a paper entitled "Rich Land and Low Sugar". In this paper it was stated that varieties were being developed by the Bureau of Sugar Experiment Stations in an endeavour to cope with the serious problem of lodging and low sugar content which occurs over a considerable acreage of several of the North Queensland mill areas. This lodging and low sugar content was most serious and widespread during 1954 and the extortionate demands of some cutters for handling any lodged cane during the season rendered the 1954 harvest a nightmare for many farmers.

Unfortunately the requirements for a variety to suit these rich lands are many and the more characters which have to be bred into a variety the more difficult the task becomes. Briefly the variety required should be of erect habit, not too vigorous, preferably with medium to thick stalks, free from suckering and with a high sugar content early in the season. It must also possess good cover since the growth of grass and weed pests on the rich lands is usually a factor with which to contend.

It was stated in the paper mentioned above that Q.57, the newly approved

variety for nothern mill areas, showed some promise for the rich low lands but possessed the disadvantages of heavy suckering and a tendency to lodge when burnt. Of several other varieties now growing in observational trials under the required conditions some four are showing indications of value. It should be pointed out that they have not yet been tried on a wide enough scale to say definitely that any one of them will fulfil all the requirements. It seems likely, however, that at least one or two of them will prove better under the particular conditions than any variety now on the approved list. At the present time these varieties have their original selection numbers. Eventually, if they continue to show sufficient promise, they will be accorded "Q" numbers. A brief description of the four canes concerned is as follows:—

I.233 is a rather thin but well stooled variety which has stood up well to flooding. It has high early sugar and has the parentage S.J.4 x A.285. From its male parent it has Korpi and *Saccharum robustum* in its blood line.

K.641 is a less vigorous type of sugar cane which stools well, has stalks of medium thickness and good cover. Its early sugar is good but this variety may lodge when well grown. It has the advantage of being very soft to cut but on that account it may be relished by rats, although up to date no excessive rat damage has appeared in it. Its parentage is Q.10 x Q.27 and, although the origin of these two varieties is not definitely known, the former almost certainly came from the cross Korpi x H.Q.409.

K.658 is another less vigorous variety of cane which at the present time is probably the most promising of the four. Its stalks are of only average thickness but it stools well and produces excellent cover. Its sugar is excellent both early and late. Indeed early in the season its sugar content is often three to four units of c.c.s. higher than that of Badila grown under comparable conditions. K.658 is the result of combining I.209 with Badila, the former variety resulting from the hybridisation of Clark's Seedling with C.278, a Badila-robustum seedling. Undoubtedly K.658 has inherited the high early sugar content of Clark's Seedling and a slightly higher fibre content from its *robustum* ancestor.

K.696 is the fourth of the promising rich land varieties and, like the previous variety, it resulted from the combination of I.209 with Badila. It also is somewhat thinner-stalked than Badila and is not expected to produce heavy crops. However its sugar content is also normally higher than that of Badila early in the season and it could quite possibly be a useful variety in the required role.

These four varieties are now being tested on farms ranging from Ingham to Mossman. The thorough testing of varieties on rich lands is not easy since floods do not occur in every year and they vary in intensity; consequently the flood resistance of a variety is often difficult to determine until the variety has been under test for several years. I.233 was originally produced in 1947 and accordingly there is more information available regarding it than the "K" varieties, which were not raised as seedlings until 1949. It is hoped to have information this year on the flood resistance of the latter. However it seems likely that, whether or not they are resistant to flooding, at least one or more of them is destined to play a useful role on those rich pockets where flood damage is not a factor.

The problem of forecasting the varietal requirements of several years hence is always a difficult one for the cane breeder. It would seem, however, that the harvesting of lodged, low sugar crops is not going to become any easier in the immediate future. The development of mechanical harvesting on a wider scale can only favour more erect types of cane since grab or rake harvesting of lodged crops is not likely to be practised in Queensland unless the mills are prepared to instal expensive laundries to remove debris. Consequently it is felt that the selection of these less vigorous varieties of cane which lodge less easily will be an important step towards assisting the easier harvesting, either manual or mechanical, of crops on some of the rich lands of the north.

New Seedling Sub-Station at Innisfail

By NORMAN J. KING

The Bureau's seedling raising has been conducted for many years at Meringa, Mackay and Bundaberg. With the establishment of the fourth Experiment Station at Ayr some years ago seedling raising activities were extended to that centre. These form the four major units in the project for breeding and selecting new cane varieties.

The high rainfall belt between Babinda and Tully has no Experiment Station, and it was felt that this area was perhaps not being adequately provided for, since the seedling canes were being grown and selected in a different climatic environment. This disability was partially solved by the establishment, at Bartle Frere in the Babinda district, of a seedling sub-station on which a large number of seedling canes was planted each year.

Recently this phase of the work has been extended to cover the Innisfail area. Through the co-operation of a Mourilyan grower the Bureau has been granted a special assignment of six acres of level land of good productive capacity, and it is on this reddish schist soil that the sub-station will function. In August, 1955, the first planting of one thousand seedling canes was performed, and the illustrations show a section of the planted area. Every seedling variety is individually pegged to ensure segregation from its neighbours.

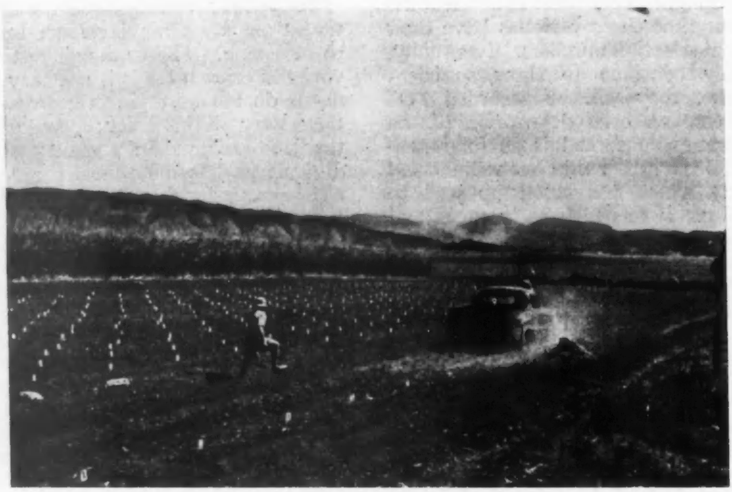


Fig. 61—The planting on the new seedling sub-station at Mourilyan. Every seedling must be pegged separately.

The normal fertilizing and farming practices will be carried out by the grower and in the middle of 1956 Bureau staff will test all seedlings and select, for replanting, any promising types. Since they are being propagated and tested under the local, high rainfall conditions of the wet belt there should be a better chance of selecting canes which are suited to the Innisfail-Tully environment.

Some of the mill areas of this high-rainfall section of the north are noted for the relatively low sugar content of their crops. Cane varieties selected in

a drier environment—where their sugar content is favourable—fail to attain to the same c.c.s. figures when grown commercially in Innisfail and Babinda. By growing large numbers of new seedling canes in that wet area it is are influenced by the amount of cloud in the earlier months of the year and by the lack of sunshine. The aim will be to select cane varieties from the sub-station which produce the highest sugar possible under such conditions

Fig. 62—Cutting and labelling the seedling canes at Meringa prior to transport to Mourilyan for planting on the new seedling sub-station.

hoped to be able to select those which produce the richest juice, even under the conditions which favour low sugar content.

It is more than likely that the low c.c.s. returns experienced in this area and which, at the same time, give favourable tonnages.

The Bureau's thanks are due to Messrs. M. & C. Ghietti of Mourilyan, without whose co-operation such a project would not have been possible.

Planting Cane in Hawaii

The machinery used in the cane fields in Hawaii is on a much larger scale than that which Queenslanders have become accustomed to, and the Hawaiian planter shown in the photographs (Figs. 63 and 64) is no exception. It is a two-row drop planter on Ewa Plantation, Oahu, Hawaii, and is a typically massive, robust implement. Each of the two hoppers holds a ton or more of setts but there is no provision for simultaneous fertilization and the setts have to be covered in the drill by another implement. The planter hoppers are loaded by a fork-lift from boxes into which the setts are cut by hand. The hoppers are tilted as they are emptied so that there are always

Fig. 63—A large two-row planter on Ewa Plantation, Hawaii.

setts in front of the dropper. His seat seems unduly large but the bucket is seen to be necessary as the superstructure sways and pitches over the ploughed ground. There was a high wind blowing when the photographs were taken and onlookers watching the planting were surprised to see the dropped setts missing the drill entirely as the wind swept them from the open end of the top part of the chute. A point of interest is that even though the slope was comparatively gentle the furrows were run on the contour. Enquiries revealed that the planting rate was of the order of half an acre per man per day when counting all labour employed on the job.—C.G.H.

Fig. 64—Front view of the Hawaiian planter. The fork-lift tractor shown in the background is used to load the planter at Ewa Plantation. The curved drills follow the contours.

Fig. 65—Planting cane in North Queensland

Fig. 66—Field of parent legumes used in the breeding project to produce improved types of velvet beans and other green manures.—Northern Sugar Experiment Station, Meringa.

Fig. 67—Giant sensitive weed smothering and flattening a crop of Badila, Innisfail, which would have yielded 30 tons per acre.

Fig. 68—Seedling pots stacked on benches ready for transplanting cane seedlings.—Northern Sugar Experiment Station, Meringa.

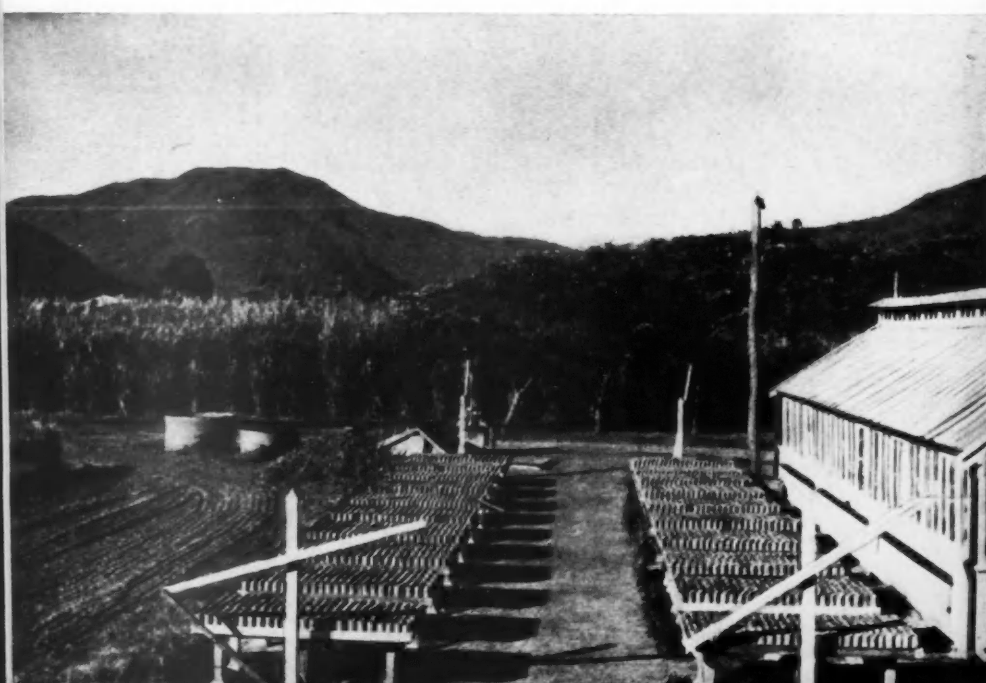
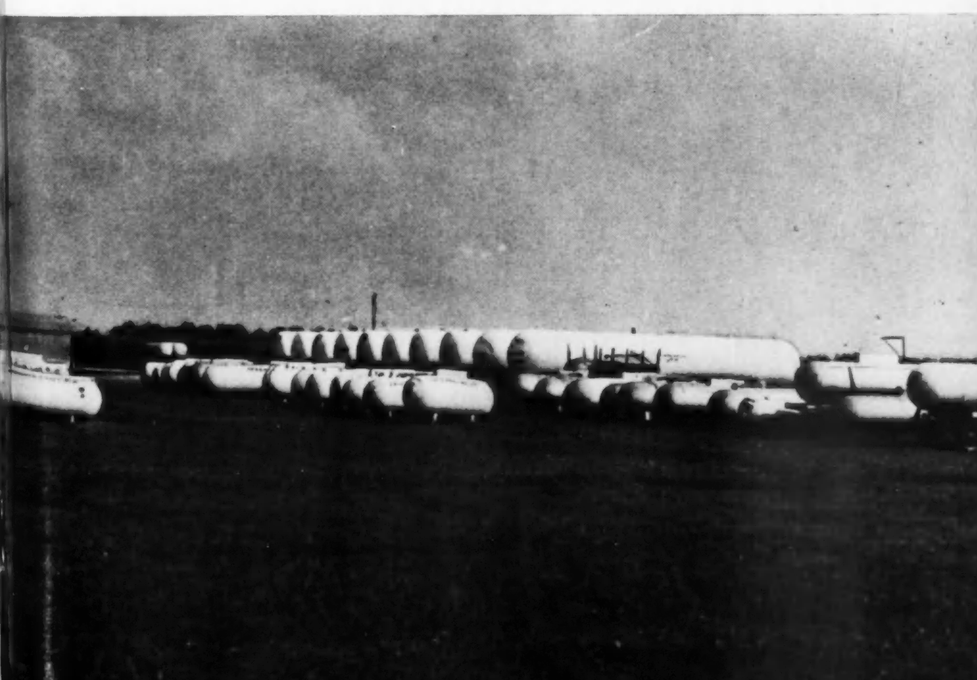


Fig. 69—The mobile sugar-beet testing laboratory of the Swedish Sugar Corporation. It makes the trip from Hilleshog, Southern Sweden, to Italy and return every year testing new sugar beet varieties en route.

Fig. 70—Storage and delivery tanks at a liquid ammonia depot in the cane belt of Louisiana, U.S.A. By far the greater proportion of the nitrogen requirements of the crop are applied to the fields as liquid ammonia.



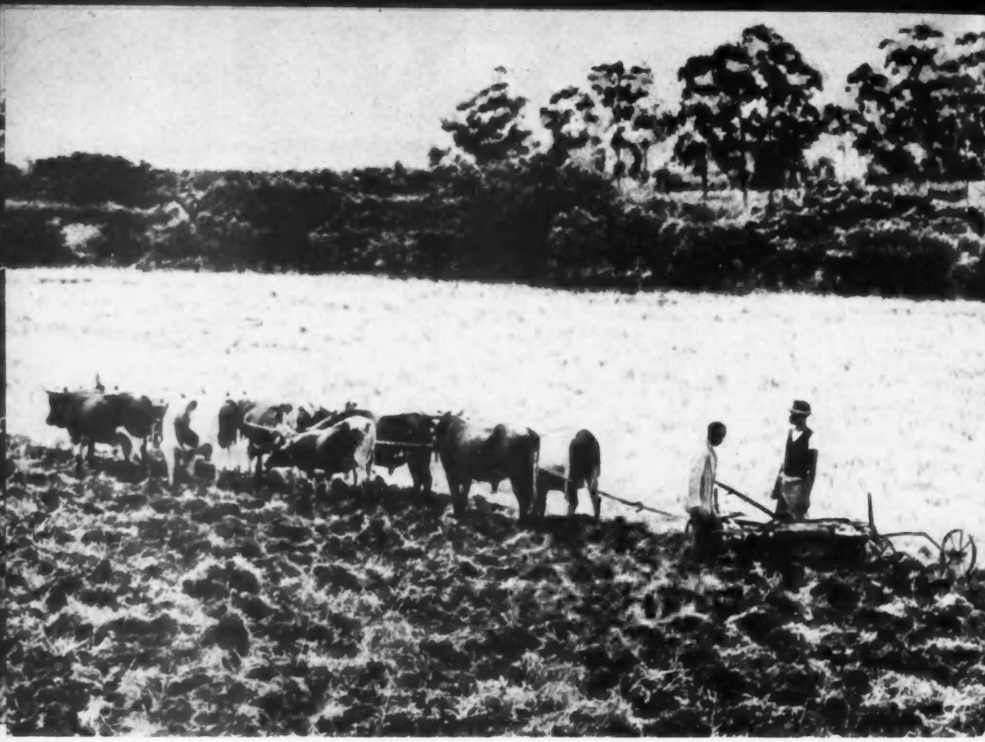


Fig. 71—Ploughing with oxen team, Zululand.

Fig. 72—A mobile loading crane developed by the Victorias Milling Company, Philippine Islands.

Nitrogen is Important

POSSIBILITIES OF GRANULATED SODIUM NITRATE AND UREA

By L. G. VALLANCE

If a crop of cane is not obtaining sufficient nitrogen it very soon begins to show symptoms of nitrogen deficiency. These symptoms take the form of a yellowish colour of the leaves which become stiff to the feel and die off to form dead trash earlier than usual. Because the upper part of the stick makes little or no growth the leaves are attached to the stalk very close together. The stalk itself is thin and the whole plant has a generally unthrifty and stunted appearance.

If the deficiency is not too far advanced and the plant still possesses some vigour, an application of a suitable fertilizer containing some readily available nitrogen will correct the trouble quite quickly. It is, of course, necessary for growing conditions to be reasonably favourable. For instance, if the land was wet and water logged the roots would be unable to function properly and could not take up any applied nitrogen. The same difficulty would also be encountered if conditions were too dry and there was insufficient moisture in the soil.

Fortunately the cane plant is a hardy type and in comparison with many other plants it requires only small to moderate amounts of nitrogen to produce a successful crop. However, most of our soils in sugar districts are very poorly supplied with nitrogen naturally, and in the great majority of cases it is necessary to apply a fertilizer containing this plant food. Because of the considerable acreage involved, the sugar industry is a large user of nitrogenous fertilizer and the annual expenditure in this respect is close to £2,000,000.

For many years sulphate of ammonia has been our major source of nitrogen supply. There are several reasons for this. Possibly the most important is that this material will maintain a reasonably good physical condition in the moist climate which characterises so many of Queensland's sugar areas. A fertilizer which absorbs moisture soon becomes so wet that it is most difficult to apply either by machine or by hand. On drying out, such material sets as hard as the proverbial rock and is again very difficult to handle. Sulphate of ammonia is by no means completely free from these disadvantages and of late years there is widespread belief among growers that its quality in this respect has considerably deteriorated.

In other countries, particularly in those of more temperate climate, fertilizers such as sodium nitrate and urea are used to supply nitrogen to crops. Unfortunately, both of these materials readily absorb water from a moist atmosphere. Because of this, their usage has been limited in tropical areas. Frequent trials have been made in the past with these types of fertilizer in Queensland but great difficulty was found in storing and handling, particularly in the wet season.

Recently, however, the large companies manufacturing these fertilizers have become interested in conditioning their products so that they may be satisfactorily used in the tropics. If this can be done there is undoubtedly a large and attractive market awaiting them, *providing that the price is competitive with that of sulphate of ammonia.* Both sodium nitrate and urea are now put up in granulated forms which seem to offer good prospects of being suitable for our conditions, particularly when packed in paper-lined bags. During last wet season the Bureau conducted storage tests in North Queensland with granulated sodium nitrate and it was found that in the paper-lined bag the material kept equally as well as sulphate of ammonia.

Experience with previous field trials using nitrate fertilizers indicates that

there is unlikely to be much difference between nitrate of soda and sulphate of ammonia insofar as the actual response in the cane crop is concerned. This experience is naturally limited at the present time and it still remains to be seen how sodium nitrate will behave under actual farm practice using the normal type of fertilizer distributors. A point to be borne in mind, also, is that nitrate of soda is more easily leached out of the soil by rain than is sulphate of ammonia. Whether the difference in this respect is sufficiently great to be of practical importance under our conditions will require checking, but it is not a drawback to the use of nitrate of soda in many other countries.

At the present moment some field and storage trials with urea are in progress in several districts. This material is also in a granulated form and its behaviour under our humid conditions is being watched with interest. Urea is a synthetic, white crystalline material. It is soluble in water and contains 46 per cent. nitrogen.

In America and Europe where urea is manufactured using nitrogen taken from the air, this fertilizer is used in very great quantities. If the results of the trials show that urea is as suitable as sulphate of ammonia for sugar cane then its usage in the industry will depend upon the price at which it is available.

As far as sugar is concerned, the cost of production is becoming ever more and more important. If these alternative sources of nitrogen are found to be equally suitable then the question of price will largely determine the grower's preference. In this connection it is necessary to remember that whilst sulphate of ammonia contains 20.6 per cent. nitrogen, sodium nitrate and urea contain 16 and 46 per cent. respectively. The application per acre would, of course, be adjusted accordingly. It takes approximately 129 lb. of sodium nitrate to supply the same amount of nitrogen as 100 lb. of sulphate of ammonia. Because of its greater concentration only about 45 lb. of urea would be required to supply a similar quantity.

The possibilities of utilising these two new forms of nitrate of soda and urea are certainly well worth while looking into, and the trials already in progress should provide some useful information. At the moment, prices quoted in Brisbane indicate that urea is cheaper per unit of nitrogen than sulphate of ammonia, while nitrate of soda is dearer. It is difficult to forecast the future, but it is reasonable to expect that if these materials were imported in larger quantities (as in the case of sulphate of ammonia) a lower price might result.

Flood Damage in the Maryborough Area

By N. McD. Smith and C. A. Rehbein

An article was published in this Bulletin in April, 1954, describing salt water damage to cane caused by exceedingly high tides in the Moreton district. In this present issue, it is intended to give some idea of the loss due to the flood waters which so disastrously affected portion of the Maryborough cane area in March, 1955. Since 1893, this area has been fortunate to evade serious damage by floods, mainly because the local water had sufficient time to subside before the main body of water from the upper reaches of the Mary River reached the city.

During the "Bertha" cyclone, some sixteen inches of rain were registered over the whole of the South Coast Curtis and the Mary River rose at the alarming rate of thirty-eight inches an hour at Tiaro on Sunday, 27th March. This resulted in a fifteen inch per hour rise the following day at Maryborough and by Tuesday flood level was four feet six inches below the 1893 record. Some cane lands were submerged to a depth

of thirty feet by backwater, whilst others were swept by a racing torrent (Figs. 73, 74). In the shopping centre, Kent Street, ten feet of dirty brown water had changed the street into a canal.

Fig. 73—Scouring and lodging occurred in the Walker's Point area.

The water level remained almost stationary for twenty-four hours and it was from three to four days before the flooding receded to within the river banks. The fields of cane which suffered from the inundation were then subjected to a mild sunshine which appeared to cause burning of that foliage not already killed by submersion. Most of the affected fields had the appearance of damage caused by very heavy frosting. No green leaf was visible and the collapse of the leaves from the sheath was well advanced a fortnight after the flooding. During this period also, decomposition of the stalk progressed to the first node below the topmost point of damage.

Some thirteen hundred acres of the areas most productive alluvial land was submerged and this represented a loss of approximately twenty thousand tons of cane. In nearly every case heavy silting had "hearted" the cane, but in one locality a racing current had removed the tops from a field of Q.50 as if by a mower blade (Fig. 75).

Fig. 74—Leaves were shredded by the swift moving waters.

Mounds of sand five feet high and two chains long were piled along fence lines and in the middle of cultivations (Fig. 76), whilst in others silt, with the tenacity of glue, was deposited to a depth of six or more inches. The damaged crops may be divided into two classes:—

(1) backward ratoons and young plant cane.

Fig. 75—The tops were cut off as if by a knife. Variety Q.50.

Fig. 76—Sand and debris deposited along a fence line.

(2) almost full grown crops with a fair length of millable stalk.

Backward Ratoons and Young Plant Cane.—Where the cane had made up to eighteen inches of solid stalk and stool development was good, growers were advised to dispose of the above ground portion either by cross rolling and discing or by rotary hoe. This applied to only plant and first ratoon fields, since with older crops it was thought best to ploughout and prepare the ground for an early planting the following year. Unfortunately the weather did not allow these operations to be carried out for showery conditions continued and made it impossible to work machinery in the fields. One grower had the residue removed by hand cutting and by late June a really good ratoon was the reward for his labour (Fig. 77).

Full Grown Crops.—In this class most of the varieties deteriorated to such an extent that by the commencement of the harvesting season they were utter failures and no returns could hope to be recovered.

Varietal Resistance to damage by water and silt.

Some idea of varietal resistance was gained from one field in which eight varieties were planted. All canes were well advanced and showing five feet of stalk. This field was submerged from three to four days. When inspected two weeks after flooding it was found that the varieties which had withstood the flooding best were, in order:—(1) N.Co.310; (2) Q.47; (3) Q.50 and Q.28. There was little difference between the two best (N.Co.310 and Q.47), but there was a much greater difference between second and third placings.

Fig. 77—The ruined crop was removed by hand and the soil cultivated. The stools remained alive and are ratooning well.

Other canes in the plot were:—P.O.J.2878, Q.51, Pindar and Vesta. The first named took the brunt of the current and could not be judged fairly, whilst Vesta was placed in an advantageous position on a higher terrace and on the down-stream side. Because of this it was in a better condition than either N.Co.310 or Q.47. Q.51 and Pindar were in a bad state as the top portion of the stalk had been snapped

off leaving the bare stalk, which in many cases had also been broken at the base. N.Co.310 was leaning at an angle of twenty degrees, had slight leaf shredding and suffered 50 per cent. death of the spindle. The undamaged growing points were pushing upwards, eyes had sprung but were not as advanced as Q.47, which showed a near green leaf stage. Q.50 and Q.28 under comparative conditions had up to 100 per cent. broken stalks with rotting at the base and very forward development of the side shoots. In a nearby field, C.P.29/116 ratoon showed much better external condition, but a closer examination revealed 100 per cent. death of growing points and up to two inches of decomposition down the stalk, with consequent forward development of side shoots.

Inspections made throughout the flooded areas in the district revealed almost identical results with those already stated. No ingress of rots through eyes or root bands were evident in sliced stalks of N.Co.310, which at the date of submersion had commenced to form arrow buds.

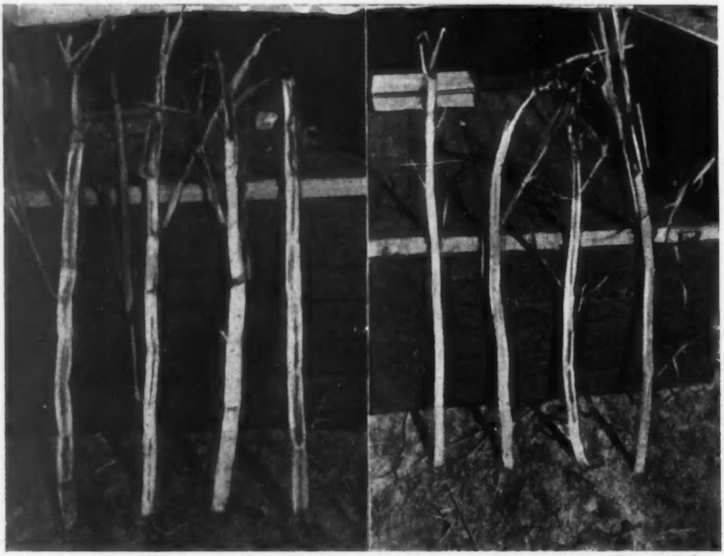


Fig. 78—Split stalks showing deterioration. Note piping and side shooting. The varieties are (left to right), Pindar, Q.50, Vesta, Q.28, N.Co.310, Q.47, Q.51, and P.O.J.2878.

Three Months Later.

A further visit was paid to the area in late June and during the time which elapsed between visits, all areas under flood and those adjacent to them had been preyed upon by army worms. These completely stripped the foliage from the cane, leaving only the bare mid-ribs. Pindar and Q.51 stalks had rotted back several nodes and had a shrivelled appearance. Side shooting had taken place from all eyes on the stalks of the different varieties except in the case of N.Co.310, where only the top three or four had sprung. However, where silting was heavy and a high moisture level was maintained, it was found that rotting of the stool was well advanced and in these cases very few eyes were attempting to shoot.

In the varieties Q.51 and Pindar, red rot was evident and the standing stalk had almost rotted through. Under these circumstances little chance of survival could be expected.

A series of stalks were split open and examined to gauge the possible holding qualities of the canes. In this examination N.Co.310 appeared to be the only

one which may have afforded some return if harvested; even so, the stalks were limp and pliable and of a watery appearance. Vesta, P.O.J.2878 and Q.50 showed no signs of advanced decay, but large pipes had formed and could provide an excellent opportunity for the ingress of rots. Q.47 had some piping of the stalk and decay had commenced, but the most obvious damage of this variety was the watery appearance of the internal tissue. Pindar, Q.51 and Q.28 were in the advanced stages of decay and a complete loss.

C.c.s. figures.

Stalk tests carried out at the Maryborough mill on flood damaged cane in the middle of June gave the following results:—

		c.c.s.
Plant cane—	N.Co. 310 ..	2.78
	P.O.J.2878 ..	−0.59
	Q.50	−0.63
	Pindar ..	2.54
	Q.51	1.35
	Q.47	−1.05
	Q.28	1.09
Ratoon cane—	Q.50	3.92
	Q.51	3.99
	N.Co.310 ..	4.38

Conclusions.

Although the data compiled may seem a little confusing, the results can be quite simply summed up by saying that none of the varieties was able to withstand the prolonged inundation of silt laden water. Where a thick deposit of silt occurred which remained too wet and heavy to cultivate the stool invariably rotted. Where cultivation was possible, and the destroyed crop was removed, it appeared that the stool stood a good chance of survival.

Cane Breeding in Louisiana, U.S.A.

Sugar cane does not flower readily in Louisiana and the Department of Plant Pathology at Louisiana State University has devoted considerable time to the development of a technique which this year is expected to provide all the cane seedlings required for the University's cane breeding activities. The photograph (Fig. 79) shows Dr. S. J. P. Chilton, the leader of the project, with the canes he is inducing to flower for the 1955 crossing season. The setts were planted in the four-gallon earthenware pots the previous October and grown in a glasshouse over the winter. They were brought out into the open in May and, as can be seen, had made quite satisfactory growth by August when the treatment was commenced. The pots are mounted on trolleys on rails and can be pushed into the tall houses seen in the background. The aim is to lessen the length of day by putting them away earlier and earlier each day. The houses are painted black inside and when the large doors are closed are quite light-tight. They measure 10 by 12 feet and are 16 feet in height at the door. The control of day length is essential if canes are to be made to flower regularly in the sub-tropics, but it is also of value in the tropics and some work on the subject has already been done at the Northern Sugar Experiment Station, the centre of the Bureau's cane breeding activities.

—C.G.H.

Fig. 79—At Louisiana State University. Dr. S. J. P. Chilton varies the length of day of potted canes to induce them to arrow. They are moved in and out of the house on trolleys.

"The Sugar Experiment Stations Acts 1900 to 1954"

LIST OF VARIETIES OF SUGAR CANE APPROVED FOR PLANTING, 1956.

Bureau of Sugar Experiment Stations,
Brisbane, 1st January, 1956.

Mossman Mill Area.

Badila, Clark's Seedling, Comus, Pindar, P.O.J.2878, Q.44, Q.50, Q.57, Q.59, S.J.4, and Trojan.

Hambledon Mill Area.

Badila, Badila Seedling, Comus, Eros, Pindar, Q.50, Q.57, and Trojan.

Mulgrave Mill Area.

Badila, Badila Seedling, Cato, Clark's Seedling, Comus, Eros, Pindar, Q.44, Q.50, Q.57, Q.59, S.J.4, and Trojan.

Babinda Mill Area.

Badila, Badila Seedling, Clark's Seedling, Comus, Pindar, Q.44, Q.50, Q.57, Q.59, and Trojan.

Goondi Mill Area.

Badila, Badila Seedling, Castor, Pindar, Q.44, Ragnar, Trojan, and Vidar.

South Johnstone Mill Area.

Badila, Badila Seedling, Clark's Seedling, Pindar, Q.44, Q.50, Trojan, and Vidar.

Mourilyan Mill Area.

Badila, Badila Seedling, Clark's Seedling, Pindar, Q.44, Q.50, Trojan, and Vidar.

Tully Mill Area.

Badila, Badila Seedling, Clark's Seedling, Eros, Pindar, Q.44, Q.50, Trojan, and Vidar.

Victoria Mill Area.

Badila, Eros, Luna, Pindar, Ragnar, Sirius, Trojan, and Q.50.

Macknade Mill Area.

Badila, Eros, Luna, Pindar, Ragnar, Sirius, Trojan, and Q.50.

Invicta Mill Area.

North of Townsville.

Badila, Eros, Pindar, Q.50, Ragnar, and Trojan.

South of Townsville.

Badila, Clark's Seedling, Comus, E.K.28, Pindar, Q.50, Q.57, S.J.16, and Trojan.

Inkerman District.

Badila, B.208, Clark's Seedling, Comus, E.K.28, Pindar, Q.57, S.J.2, S.J.16, and Trojan.

Pioneer Mill Area.

Badila, B.208, Clark's Seedling, Comus, E.K.28, Pindar, Q.57, S.J.2, S.J.16, and Trojan.

Kalamia Mill Area.

Badila, B.208, Clark's Seedling, Comus, E.K.28, Pindar, P.O.J.2878, Q.57, S.J.2, S.J.16, and Trojan.

Inkerman Mill Area.

Badila, B.208, Clark's Seedling, Comus, E.K.28, Pindar, P.O.J.2878, Q.57, S.J.2, S.J.16, and Trojan.

Proserpine Mill Area.

Badila, C.P.29/116, Comus, N.Co.310, Pindar, Q.28, Q.45, Q.50, Q.56, Q.58, and Trojan.

Cattle Creek Mill Area.

Badila, C.P.29/116, Comus, M.1900 Seedling, N.Co.310, Pindar, P.O.J.2878, Q.28, Q.45, Q.50, Q.58, and Trojan.

Racecourse Mill Area.

Badila, C.P.29/116, Comus, M.1900 Seedling, N.Co.310, Pindar, P.O.J.2878, Q.28, Q.45, Q.50, Q.58, and Trojan.

Farleigh Mill Area.

Badila, C.P.29/116, Comus, M.1900 Seedling, N.Co.310, Pindar, P.O.J.2878, Q.28, Q.45, Q.50, Q.58, and Trojan.

North Eton Mill Area.

Badila, C.P.29/116, Comus, M.1900 Seedling, N.Co.310, Pindar, P.O.J.2878, Q.28, Q.45, Q.50, Q.58, S.J.2, and Trojan.

Marian Mill Area.

Badila, C.P.29/116, Comus, M.1900 Seedling, N.Co.310, Pindar, P.O.J.2878, Q.28, Q.45, Q.50, Q.58, and Trojan.

Pleystowe Mill Area.

Badila, C.P.29/116, Comus, E.K.28, M.1900 Seedling, N.Co.310, Pindar, P.O.J.2878, Q.28, Q.45, Q.50, Q.58, and Trojan.

Plane Creek Mill Area.

C.P.29/116, Comus, E.K.28, M.1900 Seedling, N.Co.310, Pindar, P.O.J.2878, Q.28, Q.45, Q.50, Q.56, Q.58, and Trojan.

Qunaba Mill Area.

C.P.29/116, N.Co.310, Pindar, P.O.J. 2878, Q.47, Q.50, Q.55, and Vesta.

Millaquin Mill Area.

C.P.29/116, N.Co.310, Pindar, P.O.J. 2878, Q.47, Q.49, Q.50, Q.55, and Vesta.

Bingera Mill Area.

C.P.29/116, Co.290, N.Co.310, Pindar, P.O.J.2878, Q.47, Q.49, Q.50, Q.55, and Vesta.

Fairymead Mill Area.

C.P.29/116, Co.290, N.Co.310, Pindar, P.O.J.2878, Q.47, Q.49, Q.50, Q.55, and Vesta.

Gin Gin Mill Area.

C.P.29/116, Co.301, N.Co.310, Pindar, P.O.J.2878, Q.25, Q.47, Q.49, Q.50, Q.55, and Vesta.

Isis Mill Area.

C.P.29/116, N.Co.310, Pindar, P.O.J. 2878, Q.47, Q.49, Q.50, Q.51, Q.55, and Vesta.

Maryborough Mill Area.

C.P.29/116, Co.290, Co.301, P.O.J. 2878, Q.28, Q.47, Q.49, Q.50, Q.51, and N.Co.310.

Moreton Mill Area.

C.P.29/116, N.Co.310, Pindar, Q.47, Q.50, and Vesta.

Rocky Point Mill Area.

C.P.29/116, N.Co.310, Pindar, Q.28, Q.47, Q.50, Trojan, and Vesta.

NORMAN J. KING,
Director of Sugar Experiment Stations.

Approved Fodder Canes

Bureau of Sugar Experiment Stations,
Brisbane, 1st January, 1956.

All farmers are advised that the following are the varieties of cane which may be grown for fodder purposes in the sugar mill areas as set out below:—

Mossman, Hambledon, Mulgrave, Babinda, Goondi, South Johnstone, Mourilyan, Tully, Victoria, Macknade, Invicta, Pioneer, Kalamia, and Inkerman Mill Areas:

China, Uba, Co.290, "Improved Fodder Cane," and Co.301.

Proserpine, Cattle Creek, Racecourse, Farleigh, North Eton, Marian, Pleystowe, and Plane Creek Mill Areas:

China, Uba, "Improved Fodder Cane," and Co.301.

Qunaba, Millaquin, Bingera, Fairymead, Gin Gin, Isis, Maryborough, Moreton and Rocky Point Mill Areas:

China, 90 Stalk, "Improved Fodder Cane," C.S.R.1 (also known as E.G.), Co.301, and Q.60.

NORMAN J. KING,
Director of Sugar Experiment Stations.

Variety Trials at Ingham

By O. W. D. MYATT

Herbert River growers will be interested to note that since the establishment of a Bureau office at Ingham some sixty-five selected canes have already been planted out in order to determine their suitability for the conditions prevailing in the district.

Fig. 80—A row of plant Q.57, just over two months old, at Abergowrie. Note erect growth of this young cane, which is a definite advantage in nut grass country.

These cane introductions which form the central part of the planned field work are made yearly. They comprise to date, proven varieties from other countries and districts, general purpose seedlings selected for trial on local soil types and some low-vigour high quality seedlings specifically selected for Abergowrie conditions. Whilst it is true that many of them have already shown that they are not suitable for the local requirements, it is most encouraging to find at least six selections which show sufficient promise to warrant their further propagation, a step which will assist in evaluating their worth when compared to the standard district varieties.

These six selections are:—Co.475, an Indian importation which has combined both vigour and above average quality; I.233, a slow growing Meringa bred seedling (Fig. 59, page 83), selected for its ability to remain upright on the rich alluvial soils; I.222, a non-arrowing seedling with an excellent late growth performance (Fig. 58, page 83); Q.57, a general purpose cane; Q.58, a Mackay variety which appears suited to the less fertile soil types, and Q.59, a variety which shows a preference for the wetter clay soils.

Perhaps the most promising introduction to date is the Bureau's Northern bred seedling Q.57, now present in propagation plots on some thirty farms throughout the Herbert River and Ingham Line areas. Whilst it is realised that no one variety can satisfy the problems of all local soil types, Q.57 has by virtue of several good characteristics been placed well to the fore in its bid for inclusion in the approved variety list. It has shown rapid germination with quick erect early growth (Fig. 80)—an ideal combination for heavy nut grass lands where early cultivation is practiced. It is a non-arrowing cane with a proven ability to remain erect under heavy cropping, a condition which could prove invaluable in the Abergowrie area, whilst not the least of its 1955 achievements was its consistent and unmatched quality during the winter and spring months.

For any new seedling to approach or better the high standard of such locally bred varieties as Pindar and Trojan will be no mean feat, but it is hoped that these yearly introductions and trials of selected Bureau seedlings and varieties will assist in maintaining the increasing high standard of local production.

Control of Ratoon Stunting Disease in Louisiana

Experiments in Louisiana have shown that the succulent immature cane available for plants will not stand the hot-water treatment recommended for the control of ratoon stunting disease but germinations are quite satisfactory following hot-air treatment. After considerable research by Louisiana State University and United States Department of Agriculture scientists, a hot-air treatment chamber (Fig. 81) has been designed which will give an even distribution of heat through the setts in a batch and can be manufactured at a reasonable cost. The chamber measures six by six by eight feet internally and, after sealing the unit, the air is circulated past a series of electrical heating cones. Baffles are so placed that the driven air gives a uniform temperature everywhere in the box. The cane, which comes in three to four feet lengths, is laid on racks in a wheeled frame and pushed into the box. The air temperature is maintained at 57° C. for the eight-hour treatment and an internal temperature in the setts of 52° C. for at least four and a half hours is obtained. The frame holds approximately one and a quarter short tons and with two charges each box will treat per day sufficient plants for one acre. The cost of each unit is $875 and the racks $250 for two. It is expected that 50 of these standard units will be operating in Louisiana for the 1955 planting, in addition to two larger units.—C.G.H.

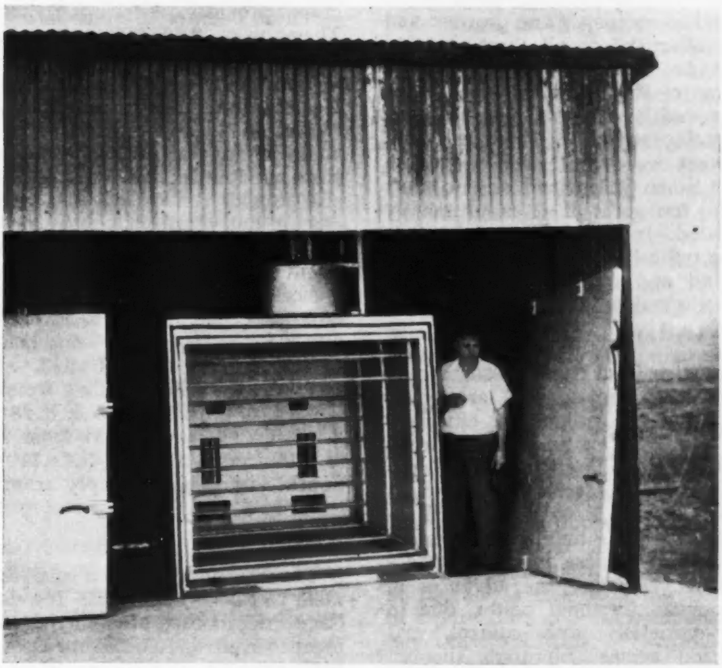


Fig. 81—The hot-air treatment unit adopted as standard in Louisiana in the campaign against ratoon stunting disease.

Random Gleanings

From reports received it appears that the aerial spraying which was conducted to kill large areas of Giant Sensitive Plant was effective in the Tully area but not at Mourilyan and South Johnstone. Evidently the topography of the country in the two last-mentioned areas was an obstacle to good coverage of the pest. It is now planned to tackle these patches on the ground by burning, spraying and mechanical means. Cane growers and local authorities in all three districts should be vitally interested in the outcome of this work since the plant has proved its capacity to ruin cane and grazing land alike. This is probably the worst weed pest ever to gain a hold in North Queensland, and no effort will be too great if it is ultimately eradicated. In our next issue an article will be published describing this plant in detail and outlining the methods being adopted for its control.

Statistics from the 1954 sugar crop show that Inkerman Mill area once more heads the production efficiency list. With over eleven thousand acres harvested for milling the average crop per acre was 46.4 tons and the sugar per acre was 6.7 tons. The State averages were 26.8 and 3.5 tons respectively. Inkerman has made big strides in recent years and the advances in efficiency are, without doubt, due to better varieties, grub control, and protection against pineapple disease.

During the past few months Mr. G. Wilson, Senior Entomologist at Meringa, has visited most Cane Pest and Disease Control Boards in Queensland to examine in detail the operation of each hot-water treatment unit. The curing of ratoon stunting disease in cane has been shown to require very precise conditions in regard to temperature and time, and it was considered desirable to study the characteristics of each unit since they varied so greatly in shape, size, heating method and circulation. It was also of prime importance to see that the ratio of water to cane setts was not too low. Each Board, whose treatment unit has been tested, is to receive a report on Mr. Wilson's findings.

An analysis of cane varieties harvested in Queensland for the 1954 crop provides interesting reading. There were 2,804,000 tons of Q.50 harvested for milling, and over two million tons of this were crushed in the Mackay-Proserpine district. Pindar was second on the list with 2,313,471 tons, while Trojan and C.P.29/116 were in third and fourth places. Badila declined still further to 769,739 tons and one cannot but recall that it is less than 20 years since it used to contribute about two million tons to the crop. Queensland bred varieties constituted 80.3 per cent. of the total tonnage crushed, the remainder being made up of C.P.29/116 from United States, Badila and Badila Seedling from New Guinea, P.O.J.2878 and E.K.28 from Java, Co.290 and Co.331 from India, M.1900 from Mauritius, N.Co.310 from South Africa, and Pompey from Fiji.

The Bureau now has a small assignment to Rocky Point Mill. The Central Cane Prices Board granted this assignment to overcome a difficulty associated with disposal of the 100-150 tons of cane which are produced each year on our Pathology Farm at Eight Mile Plains. Efforts to dispose of the crop from the various disease trials by giving it away to district dairy farmers were not successful, since their interest in such fodder was confined to drought years. Any canegrower is aware of the problems associated with disposal of a considerable tonnage of cane, and the only outlet appeared to be the Rocky Point Mill—even though it is a good distance away.

The 1955 crossing season was a busy one for the cane breeders. Arrowing was exceptionally heavy as well as being early, and the period available for cross pollination was short. At Meringa the large number of 405 crosses was made in addition to the mass pollination (polycross) work. Much of the seed from this wide range of crosses has been planted at the four Sugar Experiment Stations, and the remainder carried over in refrigerated storage. The four Stations will raise from this seed some 32,000 new seedling varieties with a wide range of parental combinations. A considerable number of new varieties from various countries contributed to this year's breeding programme.

We were interested to read in the Louisiana Sugar Bulletin that "The scientists of the United States Department of Agriculture and Louisiana Agricultural Experiment Station believe that stunting disease is the major cause of varietal deterioration, or the decline in yielding ability of cane varieties after being released". This belief was first expressed by members of the Bureau staff in a paper which was presented at the 1953 International Technologists Congress in the British West Indies, and since that time the evidence in support of such a concept has grown.

We commented in these columns previously on the aerial survey being made of the South African cane producing lands. In the report of the South African Sugar Association Council it is stated that of the total area occupied by cane farms in the industry, estimated at 805,863 acres, 318,007 acres have now been photographed and mapped. Maps of this photographed area are being sold to cane growers at the exceptionally cheap cost of 9d. per acre and it is hoped that in time all growers will avail themselves of the opportunity of obtaining maps of their farms.

The South African Sugar Association is to be commended on initiating this service to their growers.

The very low sugar contents registered in many fields of Pindar, Q.50 and Trojan in the far north during the 1955 crushing season accentuates the desirability of every farmer growing several varieties of cane. These three above-mentioned varieties in normal seasons have a good sugar content and their lapse in several areas during 1955 is no doubt due to the abnormal rainfall, lack of sunshine during the growing period of the cane and the very open winter with practically no cold weather.

In many instances the outstanding yield of one or other of these varieties has led a farmer to pin his faith on that variety alone and to grow no other on his farm. This has led to disastrous results this year on a number of farms and highlights the advisability for every farmer to grow three or more varieties so that if the season is not a normal one all his eggs are not in the one basket. If several varieties are grown it is unlikely, even in an unusual season, that all will be low in sugar. If they are, then it is probable that mill average will also be low and the farmer's individual loss will not be so serious.

Figures are sometimes interesting even if they only make us stop and think. Someone has calculated that over each square mile of the earth's surface there is sufficient nitrogen in the air to make about 120 million tons of sulphate of ammonia. But it is present in the air as elemental nitrogen, *i.e.* in a pure state and not combined with any other substance. Nitrogen combines with hydrogen to form ammonia, or with oxygen to form nitrate. In this condition it can be assimilated by a plant, but unfortunately for the cane farmer, a crop cannot utilise the pure nitrogen which is so abundant in the atmosphere. A plant which is suffering from nitrogen deficiency is actually starving although surrounded by plenty. However, there is at least one practical way in which a farmer can utilise some of this tremendous supply of free plant food. The growing of green manure legumes such as velvet beans, cowpeas,

etc., is the answer to this question. It is now a well known fact that certain bacteria live in association with the roots of such plants, and these are capable of taking the nitrogen from the air and passing it on to the plant tissues. When the legume ultimately dies, or is ploughed under, it provides residues which are rich in nitrogen. After the residues decompose, the plant food is released and becomes, in time, available to the cane crop. The Bureau maintains stocks of these useful bacteria and the note on the back cover of this Bulletin gives details of how they may be obtained.

Ratoon Failures at Bundaberg

By H. G. KNUST

EDITOR'S NOTE.—This was the subject of a recent broadcast talk by Mr. Knust over Station 4BU Bundaberg.

There has been considerable publicity recently concerning a particular type of poor ratooning, the so-called "Verticillium disease", which has occurred during the last three or four years on a number of farms in the Bundaberg district. In case farmers might tend to think that the Bureau is not very much concerned about the disease the Director, Mr. N. J. King, has asked me to talk to you to-day about the Bureau's activities aimed at its control.

As you know, an extra officer, an assistant agronomist, who is an agricultural graduate of the University of Queensland, where he received a wide training in technical and practical agriculture, has been stationed in your district for some months. He is in constant personal consultation with the specialist pathologists and soils men in Brisbane and implements the programme which they and he in discussion work out.

This Verticillium problem is one which has not occurred, at least in its Bundaberg form, anywhere else in the sugar world, for during the last two years four senior officers of the Bureau in the persons of Messrs. King, Buzacott, Hughes and Steindl, have enquired concerning it in most of the sugar-cane countries. Since its absence from other cane areas meant that nothing much in the way of assistance could be expected from other sugar-cane research organizations, we carried our enquiries further afield.

The literature on general pathology and soil-borne diseases was combed even more closely than usual in an attempt to find some clue to the problem and one of the aims uppermost in the mind of Mr. Hughes, our senior pathologist, when he left for overseas last May on a trip lasting several months, was to collect all the information he could about it. With that end in view he discussed the problem with such authorities as Dr. S. D. Garrett of Cambridge University, who has written a standard text book on root diseases, Dr. H. G. Keyworth, a leading British worker on Verticillium (on hops as it happens), and research workers at such U.S.A. centres as Cornell, Wisconsin, Beltsville, Los Angeles and Berkeley; all household names to plant pathologists everywhere. University professors in London, officers of other British research centres and workers in the Canadian Department of Agriculture were also contacted. Canada has long been in the forefront of fungicidal research and Mr. Hughes received much valuable information there.

In many overseas countries, notably Britain and the United States, much of the research into fungicides is in the hands of commercial firms which maintain large staff and extensive testing facilities. Contacts with these have returned dividends and the Bureau has already imported, or arranged to import, samples of the newest fungicides and soil sterilants, some of which are not yet in commercial production.

It might be thought that the Bureau is considering that fungicides alone will provide the solution. We have no such fixed opinion at the moment, but there

is a fungus or perhaps a group of fungi involved and naturally the first emphasis is on trying to find a fungicide which will put the fungi out of action. We know that fungal diseases are often controlled by the use of resistant varieties—a point which is being tested—or by treatments aimed at altering the microbiological balance in the soil. These may involve a temporary sterilizing or a fumigation with such a compound as carbon bisulphide, which although widely known as an insecticide has also been used with success against a fungal root rot in citrus and peach trees and in a wide range of ornamentals.

It must be admitted that this Verticillium-type of infection has in many instances proved very difficult to control, but the success which has been obtained in hops (by resistant varieties) and in nurseries (by soil sterilization) shows that the problem is not insuperable. Farmers are assured that the Bureau is exploring every possible avenue with the utmost vigour.

Control of Nut Grass by Maleic Hydrazide

By J. C. SKINNER

EDITOR'S NOTE.—The following article contains some interesting information obtained as a result of an experiment recently carried out by Dr. Skinner at the Northern Sugar Experiment Station. However, it might be pointed out that at the present time the cost of maleic hydrazide is in the region of twenty shillings per pound. Because of this, and also the possibility of injury to the cane plant, it is of doubtful value for use in growing cane. The cheaper and lighter application of 2,4-D has been shown to be an economical form of temporary control in nut grass infested fields.

A small experiment this year on the Northern Sugar Experiment Station indicates that nut grass (*Cyperus rotundus*) can be controlled for long periods by maleic hydrazide. Maleic hydrazide inhibits plant growth when very small amounts are sprayed on the leaves. Last year it was found that this chemical can be used to delay early flowering sugar-cane varieties so that they can be crossed with late flowering varieties.[3] It has also been used to slow down the growth of lawns so as to reduce the frequency of mowing.

Overseas workers [1,2,5,6] found that maleic hydrazide controls *Agropyron repens*, a perennial weed with underground stems. Maleic hydrazide provides a new method of weed control and it was considered desirable to test this method on nut grass.

On 1st April, 1955, a dense stand of nut grass about twelve inches high was treated with 25 lb. per acre of the sodium salt of maleic hydrazide. A 1.6 per cent. aqueous solution was sprayed on the leaves at the rate of 156 gallons per acre. An adjacent plot was left unsprayed as a control. No replication was used, each plot being 3 ft. 6 in. by 3 ft. 6 in. On 6th April both plots were hoed thoroughly to a depth of three inches to destroy the tops. On 13th April about 30 young shoots appeared in the control plot and none in the sprayed plot. Next day many shoots appeared in the sprayed plot, but they grew very slowly. On 15th April hundreds of healthy shoots about four inches high were present in the control plot, whereas only 40 stunted shoots about two inches high were present in the sprayed plot. On 4th May, four weeks after the plots were hoed, the control plot was occupied by a dense stand of nut grass about ten inches high and starting to flower. The sprayed plot had only a few stunted nut grass plants (Fig. 82). Annual weeds were starting to take over the sprayed plot and there was some encroachment of nut grass from the untreated outside area. On 3rd June the sprayed plot was occupied by a dense stand of annual weeds whereas the control plot was occupied by a dense stand of nut grass. Both plots were again hoed thoroughly to a depth of three inches to destroy the tops.

Observations at the end of September

showed that much less nut grass was present in the sprayed plot than in the unsprayed plot. Nut grass had been partially controlled for six months by the single application of maleic hydrazide.

Fig. 82—Nut grass control with maleic hydrazide. Note heavy nut grass growth on the unsprayed section on the left. Section on right was sprayed with 1.6 per cent. solution in April, 1955. Photograph was taken a month later.

This new method appears to have definite possibilities for the control of persistent perennial weeds such as nut grass. It has some advantages over other methods of weed control. The soil is not sterilized at all and since maleic hydrazide does not kill the original tops the plants absorb large amounts of it.

Nut grass can be controlled for a period up to eight weeks by the application of one pound per acre of the sodium salt of 2,4-D. Two sprayings give three months control enabling the cane to become well established.[4] This is the best practical method of controlling nut grass and it is used by many farmers. However, 2,4-D does not penetrate beyond the first nut and repeated sprayings are necessary as secondary nuts germinate. Maleic hydrazide apparently penetrates the whole plant, including the secondary nuts. However, it is in the early stages of testing, and more experiments are necessary before any recommendations are made.

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FREE SERVICES TO CANE GROWERS

The Bureau offers the following free services to *all* cane growers in Queensland:—

Soil Analysis and Fertilizer Recommendations

Your soil will be analysed by the most modern methods, and a report will be posted containing a recommendation covering the type of fertilizer required, the amount per acre, the need for lime, and other relevant information. Phone the nearest Bureau office and the soil samples will be taken as soon as possible.

Culture for Green Manure Seed

The Bureau laboratories in Brisbane will post to any cane grower sufficient fresh culture to inoculate seed of cowpeas, velvet beans, mung beans or other types being grown. Instructions for use of the culture will be enclosed. Address your request to The Director, Bureau of Sugar Experiment Stations, Brisbane, *but allow at least a week, after receipt of your letter, for the culture to be prepared and posted.*

Advice on All Phases of Cane Growing

The Bureau staff is at the service of all cane growers. They can best advise you on matters pertaining to varieties, fertilizers, diseases, pests, drainage and cultural methods. Bureau officers are available in every major cane growing district. A phone call will ensure a visit to your farm.